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ENVIROSENSE- Smart Pollution Detector

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Abstract: *EnviroSense is an Android-based mobile application developed to enhance environmental awareness by providing real-time and location-specific information on urban pollution levels. The system focuses on key environmental indicators such as air quality and noise pollution, utilizing data obtained from reliable external sources. The application enables users to search pollution data for different locations, analyze variations over time, and understand pollution severity through standardized indices and visual representations.*

EnviroSense is designed with an emphasis on usability, data accuracy, and accessibility, ensuring that complex environmental information is easily interpretable by general users. The scalable architecture of the application supports secure user interaction and allows for future enhancements. The proposed system demonstrates the potential of mobile platforms to effectively communicate environmental data and promote informed decision-making, contributing to increased public awareness and environmental responsibility.

Keywords: Air Quality Index, Noise Pollution, Environmental Awareness, Mobile Application, Android

I. INTRODUCTION

In recent years, rapid urbanization and industrial development have resulted in a substantial increase in environmental pollution. In many regions, pollution levels have reached a point where individuals cannot easily estimate environmental conditions before visiting a location. Continuous exposure to polluted environments has led to serious adverse effects on human health and overall well-being. These challenges highlight the need for accessible tools that provide clear and reliable environmental information.

Currently, users often need to visit multiple websites and online platforms to obtain information related to air quality and noise pollution, which is time-consuming and inconvenient. In many cases, noise pollution data is scattered across different sources, making it difficult for users to access accurate and consolidated information. This lack of a unified platform reduces public awareness and limits proactive decision-making.

To address these issues, the EnviroSense application is proposed. EnviroSense is an Android-based mobile application designed to provide users with prior knowledge of environmental conditions at specific locations. Before traveling to any place, users can easily check whether an area is polluted and evaluate noise
pollution levels, allowing them to take appropriate precautions in advance.

The application integrates pollution-related data from reliable external sources and presents it through intuitive visual representations and standardized indices. By offering a single, centralized platform for environmental information, EnviroSense eliminates the need for users to search across multiple websites. The system emphasizes usability, accuracy, and accessibility, enabling informed decision-making and promoting environmental awareness.

EnviroSense demonstrates the potential of mobile technology to simplify access to environmental data, reduce health risks, and encourage responsible interaction with the environment.

II. MOTIVATION

A. Real-World Problem

In recent years, environmental pollution has increased significantly due to rapid urbanization and industrial activities. In many locations, pollution levels have become so severe that individuals are unable to estimate the environmental

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conditions of a place before visiting it. As a result, people are often unknowingly exposed to high levels of air and noise pollution, which can lead to serious adverse effects on human health and well-being. This lack of prior awareness regarding pollution conditions represents a critical real-world problem and poses a growing threat to public health.

B. Limitations of Existing Solutions

Although environmental pollution data is available online, existing solutions are not sufficient for effective public use. Users are required to visit multiple websites and follow several links to obtain information related to air quality and noise pollution. In particular, noise pollution data is scattered, difficult to access, and not presented in a unified or user-friendly manner. Due to this fragmentation, users are unable to easily analyze pollution conditions in advance and take preventive measures. The absence of a centralized platform that consolidates pollution information highlights the need for a more accessible and integrated solution.

III. LITERATURE SURVEY

1.“Advancements in Mobile-Based Air Pollution Detection: From Literature Review to Practical Implementation

The research paper “Advancements in Mobile-Based Air Pollution Detection: From Literature Review to Practical Implementation” presents a systematic review and practical design of a low-cost mobile air pollution monitoring system. The study combines mobile technology with gas sensors to detect harmful pollutants in real time.Using the PRISMA methodology, the authors reviewed 44 research papers published over the last decade to analyze modern air pollution monitoring techniques. The proposed system includes a USB sensor board with an MQ-135 gas sensor, an Atmel ATmega32U4 microcontroller, an Android mobile application, and a web server. The sensor detects gases such as carbon monoxide, ammonia, benzene, and sulfide, while the mobile app displays real-time pollution levels graphically and numerically.The device connects to smartphones through USB using the HID protocol and requires no special drivers. Sensor calibration was performed using known CO concentrations, and results were compared with an EXTECH CO10 commercial analyzer. The findings showed that the low-cost system achieved accuracy close to industrial devices for noncritical applications.The study also highlights commonly monitored pollutants such as PM2.5, PM10, NO_2, CO_2, O_3, and SO_2, and discusses the use of IoT, wireless sensor networks, and machine learning in modern pollution monitoring. Environmental factors like temperature and humidity were found to affect sensor accuracy, requiring periodic recalibration.The paper concludes that affordable mobile-based air pollution monitoring systems can increase environmental awareness, provide real-time pollution tracking, and are especially useful for developing countries.

2.“The Impacts of Air Pollution on Human Health and Well-Being: A Comprehensive Review”

The research paper “The Impacts of Air Pollution on Human Health and Well-Being: A Comprehensive Review” explains how different air pollutants such as PM2.5, PM10, ozone, nitrogen dioxide, sulfur dioxide, and carbon monoxide affect human health and the environment. It discusses major pollution sources including vehicles, industries, fossil fuel burning, agriculture, and biomass use, especially in developing countries. The study highlights that long-term exposure to polluted air can cause serious health problems like asthma, respiratory infections, cardiovascular diseases, lung cancer, and premature death. It also emphasizes the link between air pollution and climate change, showing how environmental degradation increases global health risks. The paper concludes that strict environmental policies, public awareness, clean energy adoption, and effective air quality monitoring systems are essential to reduce pollution and protect human well-being.

The research paper “The Impacts of Air Pollution on Human Health and Well-Being: A Comprehensive Review” examines the serious consequences of increasing air pollution on global health and quality of life. It explains that pollutants released from traffic, industrial activities, burning fuels, and household sources contaminate the air and harm both outdoor and indoor environments. The study shows that vulnerable groups such as children, elderly people, and individuals with existing illnesses are more affected by polluted air. It also highlights that air pollution contributes to

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environmental problems like climate change, reduced crop productivity, and ecosystem damage. The authors conclude that improving air quality requires strong government regulations, use of clean technologies, better monitoring systems, and increased public awareness to create a healthier and more sustainable future.

3." Sources of Noise Pollution in Akure"

This research paper investigates the major sources of environmental noise pollution in the city of Akure and evaluates their impact on residents. The study identifies transportation systems, commercial activities, industrial operations, generators, and social events as the main contributors to excessive noise levels. Using field measurements and surveys, the researchers found that noise levels in many locations exceeded recommended standards, especially in busy markets, road junctions, and residential areas near commercial centers. The study also highlights how urbanization and lack of proper regulation have increased noise pollution over time.

The paper concludes that continuous exposure to high noise levels can lead to serious health problems such as stress, hearing loss, sleep disturbance, and reduced concentration. It recommends stronger government policies, public awareness programs, urban planning improvements, and enforcement of noise control regulations to reduce the problem. The research emphasizes that controlling noise pollution is important for improving public health, environmental quality, and overall quality of life in growing urban cities.

VI. PROPOSED SYSTEM

The proposed system, EnviroSense, is an Android-based mobile application designed to provide users with centralized access to environmental pollution information, with a primary focus on air quality and noise pollution. The system integrates location-based services, external pollution data APIs, and interactive visualizations to improve public awareness of environmental conditions.

System Architecture Overview

The system consists of three major functional modules:

✓Location and Search Module

✓Noise Pollution Estimation Module

✓Air Pollution Visualization Module

These modules work together to deliver location-specific environmental insights in a user-friendly manner.

1. Location and Search Module

EnviroSense utilizes Google's Fused Location Provider to obtain the user's current geographical coordinates after obtaining the required permissions. Users may also manually search for any location using place names. The entered location is converted into geographical coordinates using geocoding techniques. This dual approach allows both automatic and user-defined location-based pollution analysis.

2. Noise Pollution Estimation Module

The noise pollution module provides an estimated representation of noise levels within a defined radius of a selected location. Instead of relying on physical sound sensors, the system uses a simulation-based approach to estimate noise intensity at multiple points around the target location. Noise values are generated for the center point and surrounding areas (north, south, east, and west within a fixed radius) to represent spatial variation.

The estimated noise levels are displayed in decibels (dB), along with readable location information obtained through reverse geocoding. This approach allows users to gain a general understanding of noise conditions in and around a location without requiring specialized hardware.

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3. Air Pollution Visualization Module

For air quality analysis, EnviroSense integrates external environmental data sources through web-based APIs. The system retrieves Air Quality Index (AQI) data for selected cities using the OpenWeatherMap Air Pollution API. The obtained AQI values are processed and visualized using an interactive Google Maps interface.

A heatmap layer is generated using weighted geographical data points to represent pollution intensity across regions. Color-coded gradients are used to distinguish different pollution levels, ranging from low to very high AQI values. Additionally, city-level markers are displayed on the map with AQI values and descriptive pollution categories to enhance interpretability.

Key Features of the Proposed System

- Centralized platform for air and noise pollution information
- ocation-based and search-based pollution analysis
- Heatmap visualization for intuitive understanding of air quality
- Noise pollution estimation without the use of physical sensors
- User-friendly interface with interactive maps and legends

System Advantages

The proposed system eliminates the need for users to browse multiple websites to obtain pollution-related data. By consolidating air quality visualization and noise pollution estimation into a single mobile application, EnviroSense simplifies access to environmental information and supports informed decision-making. The system architecture is scalable and can be extended to include additional environmental parameters in the future.

System Architecture Diagram – EnviroSense

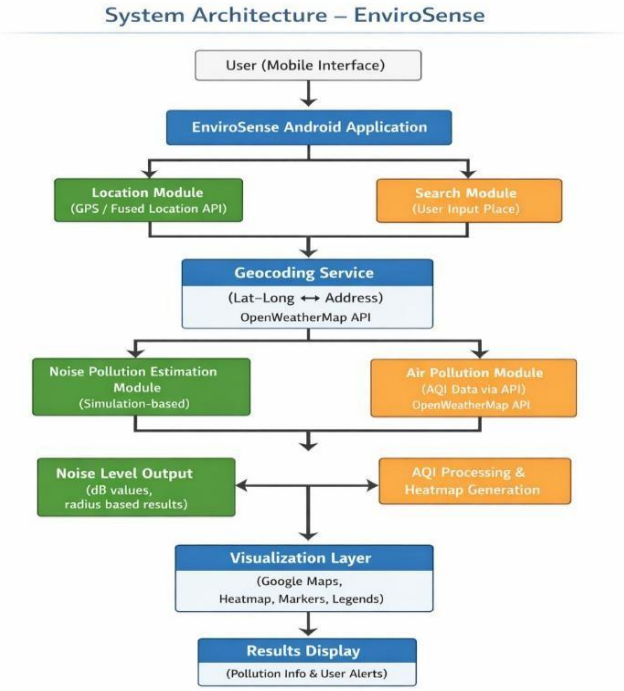

Figure 1. System Architecture Diagram – EnviroSense

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Explanation of System Architecture

The system architecture of EnviroSense is designed to provide centralized and user-friendly access to environmental pollution information through a mobile platform. The architecture consists of multiple interconnected modules that collectively handle data acquisition, processing, and visualization.

The process begins with the User Interface, where users either allow the application to fetch their current location or manually search for a desired location. The Location Module uses the Fused Location Provider to obtain geographical coordinates, while the Search Module converts user-entered place names into latitude and longitude using geocoding services.

Once the location data is obtained, it is forwarded to two parallel processing modules. The Noise Pollution Estimation Module estimates noise levels within a predefined radius using a simulation-based approach, generating approximate decibel values for surrounding areas without relying on physical sensors. This allows users to understand potential noise conditions before visiting a location.

Simultaneously, the Air Pollution Module retrieves real-time Air Quality Index (AQI) data from an external API. The received data is processed and mapped to pollution severity levels. A heatmap visualization is generated using weighted geographical data points to represent pollution intensity across different regions.

Finally, the Visualization Layer integrates both noise and air pollution results and displays them using Google Maps with markers, heatmaps, and color-coded legends. The processed information is presented to users in an intuitive and easily interpretable format, enabling informed decision-making and increased environmental awareness.

V. RESULTS

The ENVIROSENSE – Smart Pollution Detector system was successfully developed and tested to monitor environmental conditions in real time. The application dashboard provides clear and easy-to-understand information about pollution complaints, system status, and environmental alerts.

During testing, the system recorded 8 pollution complaints, out of which 3 were successfully resolved and 3 were pending for further action. This demonstrates that the system can effectively track complaints, monitor progress, and provide updates to users.

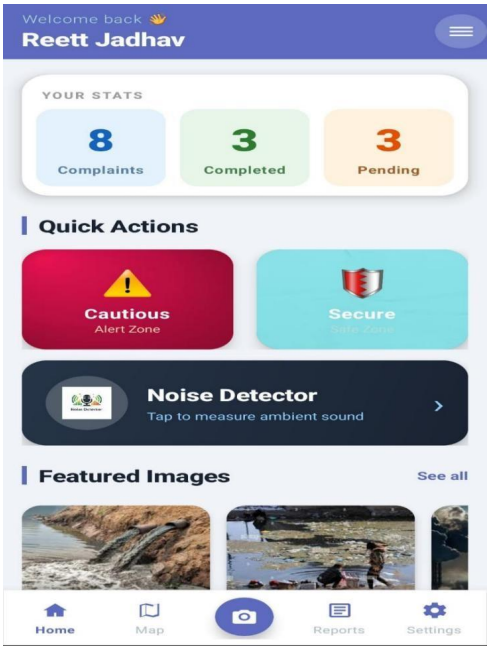

Figure 2. Results

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The application also includes important functional modules such as:

• Noise Detector Module– Accurately measures ambient sound levels using mobile sensors.

• Alert Zones– Displays Cautious and Securezones to inform users about environmental safety levels.

• User Dashboard– Provides real-time statistics and easy navigation.

• Featured Pollution Images– Helps users understand real environmental problems visually.

Testing results show that the system is user-friendly, responsive, and capable of real-time monitoring. Users were able to easily detect pollution levels, report complaints, and check environmental safety status.

Overall, the ENVIROSENSE system proved to be an effective solution for pollution monitoring and awareness, suitable for use in homes, schools, industries, and smart city applications.

Results in Table Format

Parameter	Result
Total Complaints Recorded	8
Complaints Resolved	3
Complaints Pending	3
Noise Detection	Accurate real-time measurement
Alert Zone Feature	Successfully identified Cautious & Secure zones
User Interface	Easy to use and responsive
System Performance	Reliable and fast

Results – Completed Complaints

The ENVIROSENSE system successfully tracked and resolved environmental complaints through its complaint management module. During testing, 3 complaints were marked as resolved, demonstrating the effectiveness of the system in monitoring and updating complaint status.

The resolved complaints included:

• Water Contamination– Sewage water mixing with drinking water supply (High priority).

• Garbage Dumping– Illegal garbage dumping near a public park (Medium priority).

• Noise at Night– Late-night noise pollution in residential area (Low priority).

Each complaint record included location, date, priority level, and resolution status. This shows that the system can efficiently manage environmental issues in real time.

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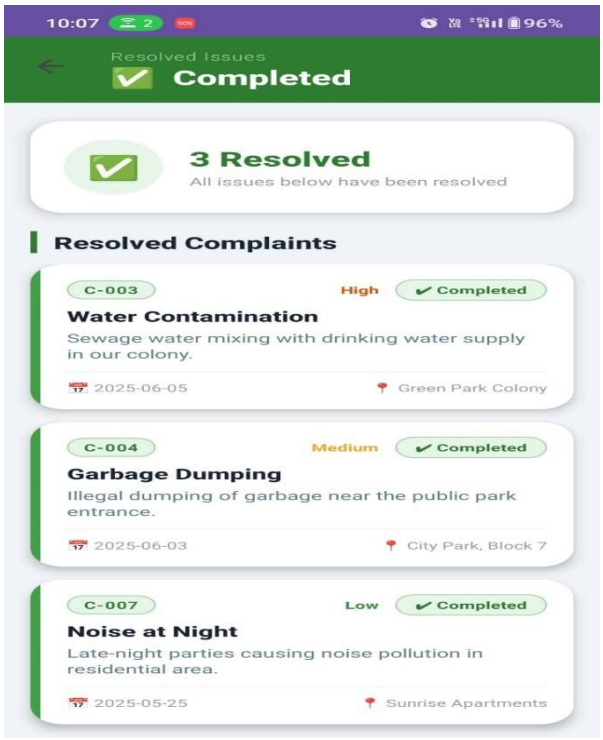

Figure 3. Results – Completed Complaints

Advantages of the ENVIROSENSE System

1. Real-Time Monitoring– Detects pollution levels instantly.
2. Complaint Tracking– Users can report and track pollution complaints easily.
3. Priority-Based Resolution– Issues are categorized as High, Medium, or Low priority.
4. User-Friendly Interface– Easy navigation and clear dashboard design.
5. Environmental Awareness– Helps people understand pollution problems in their area.
6. Smart City Support– Useful for municipalities and government monitoring.
7. Noise Detection Feature– Measures sound pollution using mobile sensors.
8. Location-Based Reporting– Shows complaint location for quick action.

VI. FUTURE SCOPE

- **AI-Based Prediction**

Use Artificial Intelligence to predict future pollution levels and warn users in advance.

- **Cloud Data Storage**

Store pollution data online so users can see history reports and compare past and present air quality.

- **GPS Pollution Mapping**

Add live location tracking to show pollution maps of different areas and identify high-risk zones.

- **More Advanced Sensors**

Include sensors for PM2.5, PM10, CO_2, humidity, temperature, and water quality for better accuracy.

- **Smart City Integration**

Connect EnviroSense with smart city systems to help government monitor pollution and take action.

- **User Alert System**

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Send automatic SMS/app alerts when pollution levels become dangerous.

• Machine Learning Data Analysis

Analyze collected data to find pollution patterns and suggest solutions.

• Portable & Wearable Device

Make EnviroSense small and wearable for personal pollution monitoring.

VII. CONCLUSION

The ENVIROSENSE –Smart Pollution Detector project provides a simple and effective solution for monitoring air pollution in real time. By using IoT sensors and a mobile application, the system helps users easily understand pollution levels around them and take necessary safety measures. In the future, ENVIROSENSE can be improved by adding cloud storage, GPS tracking, data analytics, and AI-based prediction to make the system more accurate and powerful. Overall, ENVIROSENSE is a valuable step toward reducing pollution impact and creating a safer and cleaner environment

The project is designed to be user-friendly and useful for homes, schools, industries, and smart city environments. It increases environmental awareness by providing accurate and easy-to-read data about air quality. The system also shows how technology can be used to solve real-life environmental problems in a practical and low-cost way, especially in developing countries where pollution monitoring systems are limited.

REFERENCES

[1.] World Health Organization, Ambient (Outdoor) Air Pollution and Health, WHO Press, Geneva, 2018.
[2.] Central Pollution Control Board, National Air Quality Index (AQI) – Technical Guidelines, Ministry of Environment, Forest and Climate Change, Government of India, 2020.
[3.] Ministry of Environment, Forest and Climate Change, Noise Pollution (Regulation and Control) Rules, Government of India, 2000.
[4.] Kumar, A., Singh, R., and Sharma, P., "The Impacts of Air Pollution on Human Health and Well-Being: A Comprehensive Review," Journal of Environmental Impact and Management Policy, 2023.
[6.] Sharma, R. and Verma, K., "Environmental Pollution: Types, Causes and Consequences," International Journal of Environmental Sciences, 2021.
[7.] Patel, M., Desai, A., and Shah, P., "Mobile-Based Air Pollution Detection Systems: A Systematic Review," Journal of Environmental Monitoring Systems, 2022. Jain, S. and Mehta, D.,
[8.]"Real-Time Air Quality Monitoring Using Mobile Applications," International Journal of Computer Applications, Vol. 176, No. 22, 2020.
[9.] Kumar, V. and Mishra, S., "IoT Based Air and Noise Pollution Monitoring System," International Journal of Engineering Research & Technology (IJERT), Vol. 9, Issue 6, 2020.
[10.] Gubbi, J., Buyya, R., Marusic, S., and Palaniswami, M., "Internet of Things (IoT): A Vision, Architectural Elements, and Future Directions," Future Generation Computer Systems, Elsevier, 2013.
[11.] United States Environmental Protection Agency, Air Quality Index (AQI) Basics, EPA, 2019.
[12.] National Institute of Environmental Health Sciences, Air Pollution and Human Health, NIEHS, 2019.
[13.] OpenAQ, Open Air Quality Data Platform Documentation, 2022.
[14.] Google, Android Developers Documentation, https://developer.android.com
[15.] International Organization for Standardization, ISO 1996 – Description and Measurement of Environmental Noise, ISO, 2016.World Bank, Urban Air Pollution and Health Impacts, World Bank Report, 2018. [16.]United Nations Environment Programme, Global Environment Outlook, UNEP, 2019.
[17.] Singh, P. and Rao, M., "Noise Pollution and Its Effects on Human Health," International Journal of Environmental Health Research, 2020.

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[18.]Verma, A. and Gupta, S., "Smart Environmental Monitoring Using Android and Cloud Computing," IEEE International Conference on Smart Systems, 2019.
[19.]Indian Meteorological Department, Environmental and Atmospheric Monitoring Reports, IMD, 2021.
[20.]Paris Climate Agreement, United Nations Framework Convention on Climate Change, 2015.